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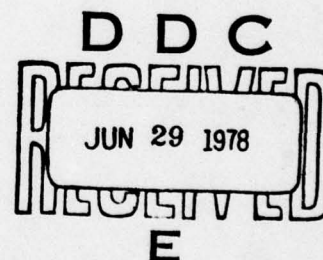
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NAVY VOCATIONAL INFORMATION SYSTEM

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# FOREWORD

The present research and development was conducted in response to Navy Decision Coordinating Paper, Personnel Supply Systems (NDCP Z0107-PN), under subproject Z0107-PN.09 (Naval Personnel Acquisition: Project CONTRACT) and the sponsorship of the Deputy Chief of Naval Operations (OP-01). The subproject's overall objective is to apply technologies of psychological measurement and computer science to the development of individualized classification and job placement strategies for recruit testing, counseling, and assignment.

This is the third in a series of reports that describe the subproject's developmental effort. Previous reports concerned Navy recruiting goal matrices and the sequential assignment problem (Special Rept. 77-7 and Tech. Note 77-13). The objective of the present study was to develop a computerized vocational information prototype system directed to the career planning needs of the typical potential Navy enlistee; namely, the high school student. Subsequent work will involve the operational test and evaluation of the current system, and the development of dialogues that deal more intensively with Navy jobs and Navy career paths. The results of this study are intended for use by the Navy Recruiting Command.

Appreciation is expressed to DP2 David S. Nelson for programming the prototype Navy Vocational Information System and for assisting in its development and trial demonstration.

J. J. CLARKIN  
Commanding Officer

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## SUMMARY

### Problem

In the military setting, the Navy enlistee must choose from among a large number of unfamiliar enlistment options and ratings early in the recruiting process. Decisions with long-range effects on a military career and on a subsequent civilian career are based largely on information available only at the recruiting station or the classifier's office. To achieve a better match between the applicant and his Navy assignment, it is becoming increasingly important to consider the total individual in terms of career objectives, interests, attitudes, background, and vocational aptitudes.

### Objective

The research objective was to develop a prototype interactive computerized occupational information system that would provide young men and women with personalized occupational guidance and a list of related civilian and Navy jobs that are the best possible match between their own attributes and typical job requirements. The system will comprise the counseling aspect of Project CONTRACT (Computerized Navy Techniques for Recruiting, Assignment, Counseling, and Testing), which is an automated personnel acquisition system that is being developed for the 1980s.

### Approach

Features from several existing career education systems designed to match personal qualifications with job requirements were modified and incorporated into a unified civilian/Navy career information system. A preliminary demonstration using a mobile van connected to a remote computer via phone lines was conducted at a San Diego high school. Sixty of the 75 students who took the Armed Services Vocational Aptitude Battery (ASVAB) used the prototype system.

### Results

The Navy Vocational Information System (NVIS) was developed, which covers 279 civilian jobs, 114 worker trait groups, 79 basic Navy occupations, and more than 100 specialized Navy jobs. A real-time system, NVIS maintains an interactive dialogue with the user via a cathode ray tube and is a prototype for an expanded Navy occupational information system. The present system is designed primarily to match the attributes of high school students and established occupational requirements. NVIS screening criteria include educational aspirations, aptitude scores, occupational interests, school subject interests, temperament characteristics, and specific job interest factors. Not only does the system acquaint students with various civilian careers that they might want to explore, but it also provides occupational information concerning Navy ratings that are related to those civilian fields.

### Conclusions

Implementation of NVIS will provide standardized occupational information to the recruit applicant, thus minimizing or at least limiting the introduction



of information bias by recruiters. The applicant will thus benefit from complete information and impartial guidance in selecting a job or training school, and the recruiter or classifier will be free of the need for broad and current knowledge of Navy occupations and training.

#### Recommendations

1. NVIS should continue in an experimental mode for the immediate future, and additional field trials should be scheduled at several different locations. One purpose of these trials would be to measure the impact of NVIS upon participation in the ASVAB testing program.

2. Additional trials would also serve to determine if a recruiter's productivity is enhanced by increasing the number of prospective recruits he is able to communicate with via the computerized dialogue.

3. User response and acceptance should be assessed, and future refinements should reflect changes suggested by recruit candidates, their parents, and the vocational counseling community.

4. Cost/benefit analyses should be performed to aid in management decisions regarding the transition of NVIS from a purely R&D mode to an operational mode.

5. Psychometric research should be undertaken to more precisely equate scores on the ASVAB with scores of its civilian equivalents--the General Aptitude Battery and the Differential Aptitude Test Battery.

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## INTRODUCTION

### Problem

Important career decisions are made early in life. Unfortunately, because the process of providing adequate career information to young men and women is so complex, costly, and time-consuming, such decisions often are made without adequate guidance. In the military setting, for example, the Navy enlistee must choose from among a large number of unfamiliar enlistment options and ratings rather early in the recruiting process. Decisions with long-range effects on a military career and even on a subsequent civilian career are based largely upon information available only at the recruiting station or the classifier's office. To achieve a better match between the applicant and his Navy assignment, it is becoming increasingly important to consider the total individual in terms of career objectives, interests, attitudes, background, and vocational aptitudes. Because of limited fiscal and human resources and a recognized need to further individualize the recruiting process, it is necessary to investigate the utility of computerized career information systems in the present and projected recruiting environments.

### Purpose

To meet future challenges posed by restricted recruiting budgets and a diminished pool of military eligibles, the Navy Personnel Research and Development Center has undertaken the development of a computerized personnel acquisition system for the 1980s that will be responsive both to the increasing management support needs of the Navy Recruiting Command and to the growing trend to individualize recruiting. Project CONTRACT (Computerized Navy Techniques for Recruiting, Assignment, Counseling, and Testing) will address each of the four aspects of the recruiting enterprise. The present report describes a prototype career education system developed to address the counseling aspect of project CONTRACT.

### Background

Most high schools provide some form of occupational information and guidance as part of their education program. Some school systems have advanced to the point where computerized occupational guidance is provided to their students. In these counseling systems, which are basically cathode ray tube and keyboard devices, students provide basic information and the system provides occupational information based upon student input.

Although traditional occupational counseling procedures have met with limited success, field tests have demonstrated the value of computer-based systems for use in occupational exploration and career decision-making (Pierce, 1972; Larkin, 1975). As a result, computer-based counseling systems are becoming increasingly popular in educational planning and career counseling programs (University provides instant counseling, 1975; McKinlay, 1974).

Impelliteri (1968) developed a computer-assisted occupational selection system that uses an IBM 1050 computer with remote terminal facilities, a tape

recorder-player, and a slide projector. It stores student aptitude score profiles and allows for student/system interaction, providing both the requested job information and amplifying information on a particular occupation. Field-test results indicate that the system is effective and is useful in assisting students to explore various occupational opportunities.

Cogswell and Estavan (1965) developed a computer-assisted counseling system that uses a Philco 2000 computer and that is based on an inferred model of a counselor's decision processes. Validity studies that compared computer output with the output of a model counselor showed about 75 percent agreement between the two.

Another computer-based counseling system, called System of Interactive Guidance and Information (Katz, 1973), is oriented primarily toward community and 4-year college students. A student interacts with the system so as to examine his own values, to obtain and use relevant information, to interpret predictive data, and to formulate plans. Examples of other computerized counseling systems include the Computerized Vocational Guidance System (Cassell, 1975), the Ventura County Occupational System (Ventura County, 1973), and the Career Information System (McKinlay, 1974).

The Armed Forces Vocational Aptitude Battery (ASVAB) is used by the Armed Forces in the selection and initial assignment of recruits. The ASVAB is a selection and classification battery that was first developed in the 1960s for use in Armed Forces recruiting efforts. However, the early versions of the ASVAB--Forms 1 through 4--were found to be unsuitable for joint-service classification testing, since they did not include tests for certain aptitudes required by one or another of the military services. This led to the development of the expanded ASVAB--Forms 5, 6, and 7--which includes 12 cognitive subtests, covering all the aptitudes included in the test batteries previously used by the various services. These tests, along with brief descriptions, are provided in Table 1.

ASVAB Forms 5, 6, and 7 cover the same information and are at the same level of difficulty. However, Forms 6 and 7 are generally administered to potential applicants at Armed Forces Entrance and Examining Stations or by mobile testing teams; and Form 5, to high school students through the Department of Defense High School Testing Program. This enables high schools to take advantage of DoD's extensive experience in aptitude testing, occupational classification, and selection; and serves to stimulate student interest in jobs and training opportunities in the Armed Services.

Close to a million students in 16,000 high schools across the country take the ASVAB each year. This experience is often a student's first direct contact with the military and, in most instances, the last. Most of them do not enter the military service; rather, they either enter the labor market or continue their education. However, since many high school students desire occupational counseling and do take the ASVAB, it seems logical to combine civilian and military occupational information utilizing ASVAB as the aptitude battery for determining entry qualifications. This is the rationale behind the development of the Navy Vocational Information System.



Table 1

## Armed Services Vocational Aptitude Battery Subtests

Subtest/ Aptitude Measured	Abbrevia- tion	Content Description
General Information	GI	A 15-item general knowledge test, primarily on sports, outdoor activities, automobile mechanics, and history. Testing time is 7 minutes.
Numerical Operations	NO	A 50-item speeded mathematical test, requiring elementary addition, subtraction, multiplication, and division--3 minutes.
Attention to Detail	AD	A 30-item speeded test in which the examinee counts the number of Cs embedded in lines of Os--5 minutes.
Word Knowledge	WK	A 30-item vocabulary test--10 minutes.
Arithmetic Reasoning	AR	A 20-item arithmetic test requiring examinees to generate a principle to solve a problem--20 minutes.
Space Perception	SP	A 20-item pictorial test. Requires examinee to select the flat pattern that could form three-dimensional stimulus figure--12 minutes.
Mathematics Knowledge	MK	A 20-item test requiring knowledge of algebra, geometry, fractions, decimals, and exponents--20 minutes.
Electronics Information	EI	A 30-item test requiring knowledge of electrical and electronic components, principles and symbols--15 minutes.
Mechanical Comprehension	MC	A 20-item test about drawings illustrating mechanical principles--15 minutes.
General Science	GS	A 20-item test measuring reasoning in the physical (N = 10) and biological sciences (N = 10)--8 minutes.
Shop Information	SI	A 20-item test on examinee's knowledge about the use of a variety of shop tools and practices--8 minutes.
Automotive Information	AI	A 20-item test on automobile parts, operations, or malfunctions--10 minutes.

## APPROACH

Useful features from four career educational systems designed to match personal characteristics with job requirements were modified and incorporated into a unified civilian/Navy career information system called the Navy Vocational Information System (NVIS). These systems are (1) the Computerized Vocational Guidance System (Cassel, 1975), (2) the Counseling Tool presented in the Occupational Outlook Quarterly (Dillon, 1975), (3) the Worker Trait Group Arrangement contained in the Dictionary of Occupational Titles (1965), and (4) the Career Information System (Stowers, 1975), which is based on the DOT arrangement. Also, information provided by the Military-Civilian Occupational Source Book (1975), a recruiting booklet entitled Navy Training-Civilian Careers (1975-1976), and the Military-Civilian Job Comparability Manual was used as the basis for comparing military and civilian occupations and for determining requirements for entry into the various Navy ratings.

Formal career guidance systems typically require aptitude and/or interest test scores as input. Existing systems are usually oriented toward specific tests/batteries, such as the General Aptitude Test Battery (GATB) or Differential Aptitude Tests (DAT). NVIS, which is currently a prototype system, uses an individual's ASVAB scores as input data, but bases its career-matching procedures on established relationships between jobs and other test batteries. This implicitly assures equivalence between the ASVAB and the other batteries as to test content, norms, and psychometric properties. To date, only one published study (Kettner, 1977) exists that explores the equivalence of ASVAB to established test batteries used in vocational counseling, with mixed results. Six of the ASVAB subtests had high correlations with GATB and DAT tests; the remaining ASVAB subtests had only low to moderate correlations with their counterparts in the other batteries. Other important differences also were suggested by the Kettner data. The Kettner study's result, considered in conjunction with the unverified assumptions of ASVAB equivalence, indicate that additional psychometric research is needed (both to establish relations between ASVAB and similar aptitude batteries, and to determine ASVAB relations to job performance and occupational training) before NVIS becomes operational.

In March 1977, a preliminary demonstration of the system was conducted at a San Diego high school, using a mobile van, remote computer, and inter-connecting phone lines. Sixty of the 75 students who took the Armed Services Vocational Aptitude Battery used the prototype system.

## RESULTS

The Navy Vocational Information System (NVIS) is essentially a computerized system that uses scores obtained by a student on subtests of the Armed Forces Vocational Aptitude Battery (ASVAB) to match personal characteristics and aptitudes with civilian and military occupational requirements. It includes the following steps:

1. Personal input is obtained by requiring the student to answer questions in the Career Education Booklet. Responses are made on a coded response sheet and fed into the computer.
2. The student interacts with the computer via a cathode ray tube (CRT) and keyboard. This dialogue allows any discrepancies inherent in the personal input to be resolved and additional information to be obtained.
3. The computer converts ASVAB subtest scores to represent the aptitude requirements of civilian and military occupations and provides the student with his Career Education Summary, which includes a listing of jobs identified by the computer as "matching" his qualifications.

### Career Education Booklet

This questionnaire booklet was developed by adapting useful features from four civilian occupational information systems. It solicits the following information from the student:

1. ASVAB Information Input (i.e., scores obtained on ASVAB subtests).
2. Education and Career Input, including:
  - a. Educational expectations (i.e., the level of education the student expects to attain).
  - b. Broad occupational interests (e.g., mechanical, scientific, etc.). The student is presented with a list of ten such areas and told to select no more than two of them. Also, he is asked to indicate how "certain" he is that the areas selected represent his strongest interests.
  - c. High school grades obtained.
  - d. Preferences for job characteristics and requirements (27 items).
3. School Subject Preferences--The student is presented with a list of 56 school subjects (e.g., biology) and told to indicate those that he has taken and liked and those in which he is interested.
4. Occupational Preferences--The student is presented with a list of 279 occupations (e.g., diesel mechanic) within 13 areas (i.e., mechanics and repairers) and told to indicate those occupations (no more than two) he feels he would most like to enter.



The civilian occupational information systems that were used as the basis for the Career Education Booklet are described below.

Computerized Educational Guidance System (VOCGUYD)

The Computerized Educational Guidance System (VOCGUYD) (Cassell, 1975) classifies 1326 job career areas (all of those listed in the 1974-75 Occupational Outlook Handbook, including different specialties or levels within those areas) along the following dimensions:

1. Personal Interest--Based on different classification schemes or instruments, such as the career cluster areas used by the Office of Education; the Kuder Occupational Interest Inventory (Kuder, 1948) and the Ohio Vocational Interest Inventory (1969), both of which are used in high schools to assess occupational interest; job skill requirement areas included in the Dictionary of Occupational Titles (DOT) (1965), etc.

2. Special Aptitudes Related to School--Based on scores obtained on tests assessing verbal, numerical, and abstract relations aptitudes.

3. Special Aptitudes Related to Work--Based on scores obtained on tests assessing clerical, mechanical, and space relations aptitudes.

4. Work Value Factorial Scores--Based on scores obtained on Work Values Inventory (Super, 1970).

5. School Success--Based on grade point average.

The Kuder Occupational Interest Inventory, which is one of the instruments used in VOCGUYD to assess personal interest, was included in the Career Education Booklet (Education and Career Input--Broad educational interests). The student is asked to select no more than two of the ten broad occupational areas included in the inventory.

Five of the aptitudes used in VOCGUYD are assessed by ASVAB subtest raw scores. These are:

1. Verbal--Assessed by Word Knowledge (WK) subtest scores.

2. Numerical--Assessed by Arithmetic Reasoning (AR) and Numerical Operation (NO) subtest scores.

3. Clerical--Assessed by Numerical Operations (NO) subtest scores.

4. Mechanical--Assessed by Mechanical Comprehension (MC) subtest scores.

5. Space relations--Assessed by Space Perception (SP) subtest scores.

In VOCGUYD, the special aptitudes related to school are considered critical attributes for success in certain kinds of schooling. Thus, for

each job in VOCGUYD, the amount of such aptitudes required for successful job performance is reported in terms of stanine scores, ranging from 1 to 9. For example, a score of 1 indicates that little or no aptitude for verbal, numerical, or abstract relations is required; a score of 9 indicates that these aptitudes are essential to the job.

The special aptitudes related to work are included in VOCGUYD only to determine whether individuals possess the minimum requirements when these aptitudes are necessary for successful job performance. Thus, for such aptitudes, each job in VOCGUYD is coded as 0--not essential (reflecting a stanine score of less than 5) or as 1--essential (reflecting a stanine score of 5 or more).

For Navy test purposes, ASVAB subtest raw scores are converted to Navy Standard Scores (NSS), which have a mean of about 50 and a standard deviation of 10. The raw scores are converted into NSS by using the standard Navy ASVAB conversion tables. Thus, for use in NVIS, it was necessary to devise a means of representing ASVAB subtest scores in terms of stanines. In Table 2, the stanines are listed, along with the percent of the normal distribution in each, the cumulative distribution, and their percentile range (the lower and upper bounds of a stanine score). Stanines were then transformed to NSS based on the percentile range. Results are provided in Table 3, which shows, for example, that the percentile range from 0 to 3 represents the lower and upper bounds of stanine 1 and NSS ranging from 27 to 31. Using this table, then, a student achieving a raw score of 16 on the Word Knowledge (WK) subtest, which assesses verbal aptitude, would have an NSS of 48 and a stanine score of 5. Similarly, a student achieving raw scores of 13 and 36 on the Arithmetic Reasoning (AR) and Numerical Operations (NO) subtests respectively, which assess numerical aptitude, would have an NSS of 54 and a stanine score of 6.

For the special aptitudes related to work--mechanical, space relations, and clerical--which are assessed by the Mechanical Comprehension (MC) subtest, the Space Perception (SP) subtest, the Numerical Operations (NO) subtest respectively, the coding system used in VOCGUYD was adapted. That is, the scores achieved were coded as 0, to reflect a stanine score of less than 5, or as 1, to reflect a stanine score of 5 or more.

Table 2

Percent of Normal Distribution, Cumulative  
Distribution, and Percentile Range for Stanines

Stanine	Percent of Normal Distribution	Cumulative Distribution	Percentile Range
1	4	4	0-3
2	7	11	4-10
3	12	23	11-22
4	17	40	23-39
5	20	60	40-59
6	17	77	60-76
7	12	89	77-88
8	7	96	89-95
9	4	100	96+
Total	100		



Table 3

Relationship Between Stanine Levels, Navy Standard Scores, and ASVAB Subtest Raw Scores

Percentile Range	Stanine Level	School Related Aptitudes						Work Related Aptitudes <sup>a</sup>					
		Verbal		Numerical <sup>b</sup>				Mechanical		Space Relations		Clerical	
		WK Raw Score	NSS	AR Raw Score	NSS	NO Raw Score	NSS	MC Raw Score	NSS	SP Raw Score	NSS	NO Raw Score	NSS
0-3	1	0	27	0	27	0-1	27	--	--	--	--	--	--
		1	27	1	27	2-7	30	--	--	--	--	--	--
		2	27	2	27	8-11	31	--	--	--	--	--	--
		3	30	3	27			--	--	--	--	--	--
		4	31	4	30			--	--	--	--	--	--
4-10	2	5	31	5	31			--	--	--	--	--	--
		6	32	6	35	12-13	32	--	--	--	--	--	--
		7	34			14	34	--	--	--	--	--	--
11-22	3	8	37			15	35	--	--	--	--	--	--
						16	37	--	--	--	--	--	--
		9	38	7	39	17	38	--	--	--	--	--	--
		10	40			18-19	39	--	--	--	--	--	--
		11	42			20	40	--	--	--	--	--	--
23-39	4					21	41	--	--	--	--	--	--
						22	42	--	--	--	--	--	--
		12	43	8	43	23	43	--	--	--	--	--	--
		13	44	9	46	24-25	44	--	--	--	--	--	--
40-59	5	14	46			26-27	46	--	--	--	--	--	--
		15	47					--	--	--	--	--	--
		16	48	10	48	28	48	--	--	--	--	28	48
						29	48	--	--	--	--	29	48
		17	49	11	50	30	49	--	--	--	--	--	--
60-76	6	18	50	12	52	31	50	9	49	10	48	30	49
		19	52			32	51	10	50	11	50	31	50
						33	52	--	--	--	--	32	51
								--	--	--	--	33	52
		20	53	13	54	34	52	--	--	--	--	--	--
77-88	7	21	54	14	56	35	53	--	--	--	--	--	--
		22	55			36	54	--	--	--	--	--	--
		23	57			37	55	--	--	--	--	--	--
						38	56	--	--	--	--	--	--
						39	57	--	--	--	--	--	--
89-95	8	24	58	15	58	40	57	--	--	--	--	--	--
		25	60	16	60	41	59	--	--	--	--	--	--
		26	60			42-43	60	--	--	--	--	--	--
						44	61	--	--	--	--	--	--
96+	9					45	62	--	--	--	--	--	--
		27	63	17	62	46	62	--	--	--	--	--	--
		28	64	18	63	47	63	--	--	--	--	--	--
		29	65	19	65	48	64	--	--	--	--	--	--
						49	65	--	--	--	--	--	--
						50	66	--	--	--	--	--	--
96+	9	30	69	20	69	--	--	--	--	--	--	--	--

Note. Data are from the Navy ASVAB Subtest Conversion Tables.

<sup>a</sup>Data provided for stanine level 5 only since subtest raw scores achieved below that level were coded 0; and those above, 1.

<sup>b</sup>The percentile range for the numerical subtest tops out at the 95th percentile.

### Counseling Tool Presented in Occupational Outlook Quarterly

This noncomputerized approach to matching personal and job characteristics was described by Dillon in the Occupational Outlook Quarterly (Spring, 1975), a periodical published by the Department of Labor. It matches 279 occupations chosen from those listed in the 1974-75 Occupational Outlook Handbook with the 25 common occupational characteristics and requirements provided by Figure 1. This assists a person who is interested in a given occupation but is "turned-off" by certain aspects of it to discover a similar vocation that does meet his personal needs.

The 279 occupations chosen for this system were included in the Career Education Booklet under the section soliciting data on Occupational Preferences. Also, 23 of the 25 occupational characteristics and requirements listed in Figure 1 were adapted for use in NVIS; that is, all but those concerned with widely scattered jobs or jobs concentrated in localities (Nos. 5 and 6). Multiple-choice questions were developed based on a specific characteristic/requirement and designed to elicit a "like," "dislike," or "not sure" response. For example, the following question was developed from No. 7 ("working with things"):

How would you feel about a job which requires working with things--jobs generally requiring manual skills and some physical coordination?

These questions were incorporated into the Career Education Booklet under the section eliciting data on Education and Career Input (educational expectations and preferences for job characteristics and requirements).

### Worker Trait Group Arrangement in Dictionary of Occupational Titles (DOT)

The abilities, personal traits, and individual characteristics that a worker must have if he is to perform adequately are referred to as "worker traits" (DOT, Volume II, 1965, p. 651). Thus, in the DOT Worker Trait Arrangement, jobs are grouped according to some combination of the following dimensions or components: (1) training time (general educational development and specific vocational preparation), (2) aptitudes, (3) interests, (4) temperaments, (5) physical demands, and (6) working conditions. These six components were selected because they provide the broadest and yet most comprehensible framework for the effective presentation of worker trait information. There are 114 such worker trait groups, organized within 22 broad areas of work (e.g., Engineering).

Three of the worker trait components listed above were adapted for use in NVIS:

1. Aptitudes--Specific capacities and abilities required if an individual is to learn or perform a task or job duty adequately.
2. Interest--Preferences for certain types of work activities or experiences.
3. Temperaments--Ability to adjust or cope with various work situations.



1. High school degree--high school diploma generally required.
2. Technical school or apprenticeship--some form of nondegree posthigh school training required.
3. Junior college--requires Associate in Arts degree.
4. College degree--requires at least a bachelor's degree. ("C" = BA degree; "G" = graduate work or first professional degree.)
5. Jobs widely scattered--jobs are located in most areas of the United States.
6. Jobs concentrated in localities--jobs are highly concentrated in one or a few geographical locations.
7. Works with things--jobs generally requires manual skills.
8. Works with ideas--uses one's intellect to solve problems.
9. Helps people--assists people in a helping relationship.
10. Works with people--job generally requires pleasing personality and ability to get along with others.
11. Able to see physical results of work--work produces a tangible product.
12. Opportunity for self-expression--freedom to use one's own ideas.
13. Works as part of a team--interacts with fellow employees in performing work.
14. Works independently--requires initiative, self-discipline, and the ability to organize.
15. Work is closely supervised--job performance and work standards controlled by supervisor.
16. Directs activities of others--work entails supervisory responsibilities.
17. Generally confined to work area--physically located at one work setting.
18. Overtime or shift work required--works hours other than normal daytime shifts.
19. Exposed to weather conditions--works outside or is subjected to temperature extremes.
20. High level of responsibility--requires making key decisions involving property, finances, or human safety and welfare.
21. Requires physical stamina--must be in physical condition for continued lifting, standing, and walking.
22. Works with details--works with technical data, numbers, or written materials on a continuous basis.
23. Repetitious work--performs the same task on a continuing basis.
24. Motivates others--must be able to influence others.
25. Competitive--competes with other people on the job for recognition and advancement.

Figure 1. Occupational characteristics and requirements used in Counseling Tool system (from Occupational Outlook Quarterly, Spring 1975).

Aptitudes. DOT based this dimension on the 11 specific capacities and abilities listed below. These aptitudes are measured by the General Aptitude Test Battery (GATB). The GATB is composed of 12 subtests and provides scores for the various aptitude dimensions. For further information concerning the GATB see Thorndike and Hagen, 1967.

1. Intelligence--General learning ability (combination of GATB Vocabulary, Arithmetic Reasoning, and Three-Dimensional Space subtest scores).
2. Verbal--Ability to understand meanings of words and ideas.
3. Numerical--Ability to perform arithmetic operations quickly and accurately (combination of GATB Computation and Arithmetic Reasoning subtest scores).
4. Spatial--Ability to comprehend forms in space and understand relationships of plane and solid objects.
5. Form perception--Ability to perceive pertinent detail in objects or in pictorial or graphic material.
6. Clerical perception--Ability to perceive pertinent detail in verbal or tabular material.
7. Motor coordination--Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed.
8. Finger dexterity--Ability to move the fingers and manipulate small objects.
9. Manual dexterity--Ability to move the hands easily and skillfully.
10. Eye-Hand-Foot Coordination--Ability to move the hand and foot coordinately with each other in accordance with visual stimuli.
11. Color discrimination--Ability to perceive or recognize similarities or differences in colors, in shades, or in other values of the same color.

In classifying jobs for the DOT worker trait arrangement, the degree to which each job requires each of the above aptitudes was determined, using a scale from 1 to 5. The amount required is expressed in terms of equivalent amounts possessed by segments of the general working population:

1. Aptitude level 1 refers to the top 10 percent of the population (i.e., from 90 to 100%). This segment possesses an extremely high degree of the aptitude.
2. Aptitude level 2 refers to the highest third of the population, exclusive of the top 10 percent (i.e., from 67 to 89%). This segment possesses an above average or high degree of the aptitude.

3. Aptitude level 3 refers to the middle third of the population (i.e., from 33 to 66%). This segment possesses a medium degree of the aptitude, ranging from slightly below to slightly above average.

4. Aptitude level 4 refers to the lowest third of the population, exclusive of the bottom 10 percent (i.e., from 10 to 32%). This segment possesses a below average or low degree of the aptitude.

5. Aptitude level 5 refers to the lowest 10 percent of the population (i.e., from 0 to 10%). This segment possesses a negligible degree of the aptitude.

Using this scale, then, a job rated 1 for intelligence would require a high degree of this aptitude; a job rated 5 would require a negligible amount.

Five of the aptitudes considered in the DOT worker trait group arrangement are measured by scores achieved on ASVAB subtests or composites of subtests. Thus, they were adapted for use in NVIS:

1. Intelligence--Assessed by a combination of Word Knowledge, Arithmetic Reasoning, and Spatial subtest scores (WK + AR + SP).

2. Verbal--Assessed by Word Knowledge (WK) subtest score.

3. Numerical--Assessed by Arithmetic Reasoning (AR) and the Numerical Operations (NO) subtest scores.

4. Spatial--Assessed by Space Perception (SP) subtest score.

5. Clerical perception--Assessed by Numerical Operations subtest score.

For use in NVIS, it was necessary to transform ASVAB raw scores to DOT aptitude levels. In Table 4, the aptitude levels are listed, along with the percent of the normal distribution in each, the cumulative distribution, and their percentile range (the upper and lower bounds of an aptitude level). Using the information shown in Table 4 and standard Navy ASVAB conversion tables, aptitude levels were transformed to ASVAB raw scores. Results are provided in Table 5, which shows, for example, that a student achieving a score of 21 on the ASVAB WK subtest should be provided with information on worker trait groups requiring a verbal aptitude level of 2 in his computerized printout.



**Table 4**  
**Percent of Normal Distribution, Cumulative**  
**Distribution, and Percentile Range for DOT Aptitude Levels**

DOT Aptitude Level	Percent of Normal Distribution	Cumulative Distribution	Percentile Range
5	10	10	0-9
4	23	33	10-32
3	34	67	33-66
2	23	90	67-89
1	10	100	90+
Total	100		

Table 5  
Relationship Between DOT Aptitude Levels  
and ASVAB Raw Scores

Aptitude Level	Percentile	Aptitudes/ASVAB Measures					
		Intelligence (WK+AR+SP)	Verbal (WK)	Numerical (AR) (NO)		Spatial (SP)	Clerical Per. (NO)
1	90	57	27	17	46	18	46
2	67	44	21	13	36	13	36
3	33	32	14	9	26	9	26
4	10	23	8	6	16	6	16
5	0	0	0	0	0	0	0

**Interests.** In DOT, five pairs of conflicting interest factors were provided, so that a positive preference for one factor of a pair would imply rejection of the other pair:

- |  |     |  |
|--|-----|--|
| 1. Situations involving a preference for activities dealing with things and objects.   | vs. | 6. Situations involving a preference for activities concerned with people and the communication of ideas.  |
| 2. Situations involving a preference for activities involving business contact with people.  | vs. | 7. Situations involving a preference for activities of a scientific and technical nature.  |
| 3. Situations involving a preference for activities of a routine, concrete, organized nature.  | vs. | 8. Situations involving a preference for activities of an abstract and creative nature.  |
| 4. Situations involving a preference for working for people for their presumed good, as in the social welfare sense, or for dealing with people and language in social situations. | vs. | 9. Situations involving a preference for activities that are nonsocial in nature, and are carried on in relation to processes, machines, and techniques. |
| 5. Situations involving a preference for activities resulting in prestige or the esteem of others.   | vs. | 10. Situations involving a preference for activities resulting in tangible, productive satisfaction.   |



Based on these conflicting pairs of factors, five questions were written for inclusion in the Career Education Booklet (Preferences for job characteristics and requirements--2.d. above). For example, the following question was developed from factors 1-6:

I would prefer working in situations which involve activities:

- a. Dealing with things and objects (substances or materials; machines, tools, equipment; products).
- b. Concerned with people and the communication of ideas.

Temperaments. In DOT, 12 statements were provided, which represent different types of occupational situations to which workers must adjust:

1. Situations involving a variety of duties often characterized by frequent change.
2. Situations involving repetitive or short-cycle operations carried out according to set procedures or sequences.
3. Situations involving doing things only under specific instruction, allowing little or no room for independent action or judgment in working out job problems.
4. Situations involving the direction, control, and planning of an entire activity or the activities of others.
5. Situations involving the necessity of dealing with people in actual job duties beyond giving and receiving instructions.
6. Situations involving working alone and apart in physical isolation from others, although the activity may be integrated with that of others.
7. Situations involving influencing people in their opinions, attitudes, or judgments about ideas or things.
8. Situations involving performing adequately under stress when confronted with the critical or unexpected or when taking risks.
9. Situations involving the evaluation (arriving at generalizations, judgments, or decisions) of information against sensory or judgmental criteria.
10. Situations involving the evaluation (arriving at generalizations, judgments, or decisions) of information against measurable or verifiable criteria.
11. Situations involving the interpretation of feelings, ideas, or facts in terms of personal viewpoint.
12. Situations involving the precise attainment of set limits, tolerances, or standards.

Nine of these situational statements were adapted for use in NVIS-- 1 through 8 and 11. From these nine statements, five questions were developed for inclusion in the Career Education Booklet (Preferences for job characteristics and requirements). For example, the following question was developed from statements 1 and 2:

I would prefer working in situations involving:

- a. A variety of duties often characterized by frequent changes.
- b. Repetitive or short-cycle operations carried out according to set procedures or sequences.

#### Career Information System

The DOT worker trait group arrangement described above serves as the hub of the Career Information System (CIS), which was developed by the Appalachia Educational Laboratory, Inc., Charleston, WV, under the sponsorship of the National Institute of Education (Stowers, 1975). Essentially, it matches a list of 56 common school subjects within 13 areas of DOT's 114 worker trait groups. Results are presented on a chart, which can be used by a student having interest and skills in certain school subject to identify related groups of occupations for career exploration. For example, DOT worker trait group 1 pertains to "Instructive Work, Fine Arts, Theatre, Music, and Related Fields." In the CIS chart, that group is related to the following general school subjects:

Speech, debate, dramatics  
Art  
Ceramics  
Instrumental Music  
Vocal Music  
Clothing, textiles, home furnishings

The CIS list of 56 selected school subjects was included in the Career Education Booklet (School Subject Preferences). As indicated previously, the student is asked to indicate subjects that he had taken and liked, as well as those in which he was interested. Thus, if he picked any of the subjects listed above, he would be presented with information pertaining to DOT worker trait group 1 in the computerized printout.

#### Summary

In summary, the following is provided regarding information solicited in the Career Education Booklet:

1. ASVAB Information Input--Scores achieved on ASVAB subtests-- provided by student.

2. Education and Career Input:

a. Educational expectations--Obtained through item developed from occupational requirements (1 through 4 in Figure 1) used in the Counseling Tool presented in Occupational Outlook Quarterly (Dillon, 1975).

b. Broad occupational interests--Kuder Occupational Interest Inventory, one of the classification instruments used in VOCCUYD to assess personal interests.

c. High school grades obtained--Provided by student.

d. Preferences for job characteristics--Obtained through items developed from (1) Counseling Tool occupational characteristics and requirements (7 through 25 in Figure 1), and (2) interest factors and situational statements used in DOT worker trait group arrangement.

3. School Subject Preferences--Obtained by matching DOT worker trait groups with listing of school subjects used in the Career Information System (Stowers, 1975).

4. Occupational Preferences--Obtained through listing of 279 occupations selected from Occupational Outlook Handbook used in the Counseling Tool system.

#### Student/System Dialogue

The student/system dialogue, which is the heart of NVIS, commences after data obtained by the Career Education Booklet is entered in the computer. The dialogue is dynamic and interactive and is not limited by the personal input provided by the booklet. For example, if, in the course of the dialogue, a student expresses an interest in a career that requires considerably more education than he indicated he expected to attain, the computer will bring this discrepancy to his attention and ask him if he wants to alter his educational plans to make them compatible with that career. Similarly, if the student expresses career aspirations that are inconsistent with his reported academic record, he will be so informed. However, the dialogue will continue whether the student chooses to heed or to ignore the highlighted inconsistency. Excerpts from a typical exchange appear below:

I'M A COMPUTER. I'M HERE TO ASK YOU SOME QUESTIONS ABOUT YOUR CAREER INTERESTS AND HELP YOU PLAN YOUR FUTURE.

BUT FIRST, JUST TO LET ME KNOW THAT YOU ARE THERE, PLEASE TYPE THE LETTER 'A' AND PUNCH THE RED KEY MARKED 'CR' (ON THE RIGHT HAND SIDE OF THE KEYBOARD).

\*\*\*\*

I'M GOING TO ASK YOU SOME QUESTIONS BASED ON THE INFORMATION YOU HAVE ALREADY GIVEN US ABOUT YOUR JOB INTERESTS.

AFTER WE HAVE FINISHED OUR CONVERSATION TODAY, I WILL MATCH YOUR INTERESTS WITH JOB DESCRIPTIONS AND REQUIREMENTS. THEN I WILL PRINT OUT INFORMATION ABOUT SEVERAL DIFFERENT JOBS YOU MAY WANT TO CONSIDER.



BUT BEFORE I SUGGEST ANY JOBS TO YOU, I WANT TO BE SURE I'VE GOT THE RIGHT INFORMATION. AS WE TALK, YOU WILL HAVE A CHANCE TO CHANGE SOME OF YOUR RESPONSES IF YOU WANT TO.

PUNCH 'Y' TO CONTINUE.

\*\*\*\*

YOU SELECTED:

PROGRAMMER  
COLLEGE AND UNIVERSITY TEACHER

AS SPECIFIC JOBS YOU MIGHT BE INTERESTED IN.  
YOU ALSO SAID THAT YOU INTEND TO:

OBTAIN A COLLEGE DEGREE (4 OR MORE YEARS OF COLLEGE).

THE AMOUNT OF SCHOOLING THAT A PERSON FINISHES IS AN IMPORTANT HIRING REQUIREMENT FOR MOST JOBS. I WILL CONSIDER YOUR SCHOOL PLANS WHILE I AM LOOKING FOR JOBS TO SUGGEST TO YOU, SO IT IS IMPORTANT TO HAVE A CLEAR PICTURE OF YOUR PLANS.

LET'S SEE HOW YOUR SPECIFIC JOBS MATCH WITH YOUR SCHOOL PLANS.

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DO YOU THINK YOUR SCHOOL PLANS MEET THE NORMAL EDUCATIONAL REQUIREMENTS FOR PROGRAMMERS?

PUNCH Y OR N AND THE CR.

\*\*\*\*

LET'S SEE IF YOU ARE RIGHT ABOUT THAT.

YOUR SCHOOL PLANS MEET THE EDUCATIONAL REQUIREMENTS NORMALLY REQUIRED FOR ENTRY INTO THIS OCCUPATION.

THIS JOB TYPICALLY REQUIRES COMPLETION OF AT LEAST A 4-YEAR COLLEGE PROGRAM.

PUNCH 'Y' TO CONTINUE.

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#### Computer Matching of Occupational Requirements with Individual Aptitudes/Preferences

In the computer matching of occupational requirements with individual aptitudes and preferences, primary emphasis is directed toward providing civilian career information. However, in conjunction with the computer search of the 279 civilian jobs taken from the Counseling Tool described

in Occupational Outlook Quarterly (Spring 1975) and the 114 DOT worker trait groups to find those jobs and trait groups that are compatible with an individual's aptitudes and preferences, an attempt is made to find comparable Navy jobs and career opportunities.

The basis for comparability of Navy and civilian occupations was derived from three sources: (1) the Military-Civilian Occupational Source Book (1975), (2) the Military-Civilian Job Comparability Manual (Undated), and (3) a recruiting booklet entitled Navy Training--Civilian Careers (1975-76). Not only were Navy/civilian jobs classified according to their comparability but, also, the 79 Navy jobs or ratings listed in Navy Training--Civilian Careers were classified according to the minimum ASVAB subtest composite scores required to qualify an individual for Navy "A" School training.

#### Career Education Summary

At the conclusion of the person-computer dialogue and the computer matching process, the student receives the results of his career and education analysis. Those results are presented in a Career Education Summary, which has five sections: Summary Information, Civilian Jobs, Navy Occupations, Worker Trait Groups, and Conclusions.

##### Summary Information

This section provides (1) ASVAB Test Results, (2) Interest Areas, Educational Goals, and School Subject Preferences, and (3) Occupational Choice/Preferred Working Conditions.

ASVAB Test Results. This subsection provides a personal record of raw scores obtained on the 12 ASVAB subtests and percentile equivalents based upon a military applicant sample. The following is an example of such a record:

SCORE	GENERAL INFORMATION	NUMERICAL OPERATION	ATTENTION TO DETAIL	SHOP INFORMATION	AUTOMOTIVE INFORMATION
ASVAB	7	37	18	13	11
PERCENTILE	18	69	85	55	54

Interest Areas, Educational Goals, and School Subject Preferences. This subsection provides a record of (1) the two occupational areas that the individual selected from the Kuder Occupational Interest Inventory, (2) the highest level of education the individual plans to complete, and (3) a list of stated school subject preferences. The following is a typical printout.

INTERESTS . . . YOU INDICATED THE TWO TYPES OF WORK THAT ARE OF MOST INTEREST TO YOU ARE:

OUTDOOR  
ARTISTIC

EDUCATION . . . YOU INDICATED THAT YOU INTEND:

TO COMPLETE A JUNIOR COLLEGE PROGRAM

SCHOOL SUBJECT PREFERENCES . . . YOU INDICATED THAT YOU LIKE THE FOLLOWING SCHOOL SUBJECTS:

1. COMPOSITION, CREATIVE WRITING, JOURNALISM
18. PHYSICAL EDUCATION
19. SPORTS, RECREATION
- 
- 
- 
51. GRAPHIC ARTS

Occupational Choice/Preferred Working Conditions. This subsection reports (1) the two occupations the individual selected from the list of 279 provided in the Career Education Booklet, (2) job conditions and work situations the individual indicated he liked, disliked, or was not sure about, and (3) preferred working situations. The following is an example of a typical summary:

OCCUPATIONAL CHOICE . . . YOU INDICATED THAT THE CIVILIAN OCCUPATIONS YOU WOULD LIKE TO ENTER ARE:

JOB NUMBER 259 WHICH IS: PSYCHOLOGIST  
JOB NUMBER 152 WHICH IS: FORESTER

JOB CONDITIONS . . . YOU INDICATED THERE ARE SOME JOB CONDITIONS AND WORK SITUATIONS THAT YOU LIKE, OTHERS YOU DISLIKE, AND OTHERS YOU ARE NOT SURE ABOUT:

JOB CONDITIONS YOU  
WOULD LIKE:

5. RESPONSIBILITY IN  
MAKING DECISIONS  
AND EXERCISING  
GOOD JUDGMENT.

6. SUPERVISORY RE-  
SPONSIBILITY IN  
DIRECTING  
ACTIVITIES OF  
OTHERS.

23. ARTISTIC WORK.

JOB CONDITIONS YOU  
WOULD DISLIKE:

7. ROUTINE AND RE-  
PETITIOUS JOBS.

22. WORKING UNDER  
STRESS.

JOB CONDITIONS YOU  
ARE NOT SURE ABOUT:

8a. OPPORTUNITY FOR  
SELF-EXPRESSION.

8b. FOLLOW A SET  
PROCEDURE.

20. HIGHLY COM-  
PETITIVE JOB.



PREFERRED WORKING SITUATIONS . . . YOU INDICATED THE FOLLOWING  
EXPRESSED YOUR PREFERRED WORKING SITUATIONS:

24. CONCERNED WITH PEOPLE AND THE COMMUNICATION OF IDEAS.

25. BUSINESS CONTACT WITH PEOPLE.

26. AN ABSTRACT AND CREATIVE NATURE.

•  
•  
•

31. EXCHANGING IDEAS AND INFORMATION WHILE DEALING WITH PEOPLE  
IN ACTUAL JOB DUTIES.

#### Civilian Jobs

This section provides the individual with a list of those civilian jobs chosen by the computer from the list of 279 that best "match" his expressed school plans, job interests, and ASVAB scores. These jobs are displayed, along with (1) their characteristics and requirements (as established by the Counseling Tool procedure (Dillon, 1975), (2) an indication of whether the individual was positively, negatively, or neutrally disposed toward each of those characteristics/requirements, and (3) related Navy jobs or ratings. It should be noted that related Navy jobs are provided for an individual's consideration only if his ASVAB scores qualify him for "A" school training for those ratings.

This section also addresses the question of whether or not the two specific occupations that the individual selected from the list of 279 in the Career Education Booklet are compatible with his stated interest areas and educational plans.

The following is an abbreviated example of this section of the print-out (for the sake of brevity, information is provided for only one of the "matched" occupations).

#### COMMERCIAL ARTISTS:

COMMERCIAL ARTISTS CREATE THE ARTWORK APPEARING ON BILLBOARDS  
AND IN NEWSPAPERS, MAGAZINE ADVERTISEMENTS, BROCHURES, CATALOGS,  
AND TELEVISION COMMERCIALS.

THIS OCCUPATION TYPICALLY PROVIDES OR REQUIRES:      FOR YOU THIS IS A:

OPPORTUNITY FOR SELF-EXPRESSION . . . . . NEUTRAL FEATURE  
WORKING AS PART OF A TEAM . . . . . NEUTRAL FEATURE

OVERTIME OR SHIFT WORK . . . . .	NEUTRAL FEATURE
WORKING WITH IDEAS . . . . .	POSITIVE FEATURE
WORKING WITH DETAILS . . . . .	NEGATIVE FEATURE
WORKING UNDER CLOSE SUPERVISION . . . . .	NEUTRAL FEATURE
MOTIVATING OTHERS . . . . .	POSITIVE FEATURE
JOB SATISFACTION OBTAINED FROM SEEING PHYSICAL RESULTS OF WORK . . . . .	POSITIVE FEATURE

THIS OCCUPATION IS RELATED TO THE FOLLOWING NAVY JOB RATINGS:

DRAFTSMAN

THE OCCUPATION OF PSYCHOLOGIST WAS NOT SELECTED AS A POSSIBLE CAREER CHOICE BECAUSE:

IT WAS NOT IN ONE OF THE INTEREST CATEGORIES THAT YOU SELECTED.  
IT IS SOCIAL SERVICES.

YOUR EDUCATIONAL PLANS ARE INCONSISTENT WITH THE JOB REQUIREMENTS.  
THIS JOB NORMALLY REQUIRES: A 4-YEAR COLLEGE DEGREE.

THE OCCUPATION OF FORESTERS WAS NOT SELECTED AS A POSSIBLE CAREER CHOICE BECAUSE:

YOUR EDUCATIONAL PLANS ARE INCONSISTENT WITH THE JOB REQUIREMENTS.  
THIS JOB NORMALLY REQUIRES: A 4-YEAR COLLEGE DEGREE.

#### Navy Occupations

Many of the Navy's 79 enlisted ratings require extensive formal Navy training (i.e., "A" Schools) that may not be immediately available upon enlistment. Thus, this section provides a listing of all Navy ratings that the individual could probably qualify for, based on his ASVAB scores. This listing is provided to indicate to the individual that such careers are available within the Navy, whether or not they appear as a result of matching his aptitudes and preferences with (1) the list of 279 civilian occupations (see above) or (2) the 114 DOT worker trait groups (see below). However, the actual availability of these jobs or ratings must be established by actually visiting a Navy recruiter.

The following is an example of the information provided in this section:

OF THE 77 BASIC JOBS IN THE NAVY, YOUR ASVAB APTITUDE SCORES INDICATE THAT YOU WOULD PROBABLY QUALIFY FOR THE NAVY JOBS LISTED BELOW. YOU MAY FIND THAT SOME OF THESE JOBS ARE ALSO LISTED AS RELATED TO THE CIVILIAN JOB IN "SECTION II--CIVILIAN JOBS" OF THE PRINTOUT.

AG AEROGRAPHER'S MATE  
AC AIR CONTROLMAN  
PR AIRCREW SURVIVAL EQUIPMENTMAN  
AW AVIATION ANTISUBMARINE WARFARE OPERATOR  
AX AVIATION ANTISUBMARINE TECHNICIAN  
AB AVIATION BOATSWAIN'S MATE

•

•

•

UT UTILITIESMAN  
YN YEOMAN

FOR MORE INFORMATION ABOUT NAVY JOBS, YOU SHOULD CONTACT YOUR LOCAL NAVY RECRUITING OFFICE.

#### Worker Trait Groups

In this section, the individual is provided with additional civilian jobs for his consideration. These jobs were selected by the computer by matching the individual's school interests, aptitude (ASVAB) scores, and preferred working situations with the duties and requirements of each of the 114 DOT worker trait groups. For each "matched" worker trait group, the following is provided:

1. A reference to the DOT volume and page where a complete description is provided.
2. Skills required to perform the type of work.
3. Training required and information regarding method of entry.
4. Examples of civilian jobs using required skills.
5. Related Navy jobs or ratings.

In this case, the comparability of civilian jobs and Navy ratings was based on the Military-Civilian Comparability Manual, which deals with other than entry level ratings.



The following is an example of the information that NVIS would provide regarding a specific worker trait group:

WORKER TRAIT GROUP: CORRESPONDING AND RELATED WORK.  
(DOT VOL. II PAGE 256)

WORK PERFORMED: WORK ACTIVITIES IN THIS GROUP PRIMARILY INVOLVE PREPARING CORRESPONDENCE, REPORTS, FORMS, AND OTHER DOCUMENTS, AND EXAMINING, EDITING, AND RECORDING VERBAL INFORMATION OR WRITTEN MATERIAL.

TRAINING AND METHODS OF ENTRY:

ENTRY INTO THIS KIND OF WORK USUALLY REQUIRES HIGH SCHOOL GRADUATION AND COMPLETION OF SEVERAL SEMESTERS OF COLLEGE WITH EMPHASIS ON COURSES IN ENGLISH GRAMMAR AND COMPOSITION.

ENTRY IS FREQUENTLY ACCOMPLISHED BY ADVANCEMENT OR TRANSFER FROM CLERICAL POSITIONS WHEREIN INDIVIDUALS HAVE BECOME FAMILIAR WITH CORRESPONDENCE TECHNIQUES AS A RESULT OF CONTINUAL EXPOSURE.

AN EXCELLENT WAY TO ACQUIRE THE NECESSARY BACKGROUND SKILLS FOR A CIVILIAN CAREER IN THIS FIELD IS TO OBTAIN TRAINING AND EXPERIENCE IN THE RELATED NAVY OCCUPATIONS.

EXAMPLES OF CIVILIAN JOBS:

CORRESPONDENCE CLERK

SPECIAL-CERTIFICATE DICTATOR

TOWN CLERK

RELATED NAVY OCCUPATIONS:

PERSONNELMAN (PN)  
LEGALMAN (LN)  
YEOMAN (YN)

PERSONNELMAN (PN)  
LEGALMAN (LN)  
YEOMAN (YN)

PERSONNELMAN (PN)  
LEGALMAN (LN)  
YEOMAN (YN)

Conclusions

This section supplies information regarding occupational options, depending on whether or not the student feels the civilian and Navy occupational possibilities presented in the computer printout are compatible with those he is considering as probable career fields. If he feels they are compatible and would like additional information, he is advised to seek additional information from the school guidance counselor or, where applicable, from a Navy recruiter.

If he feels they are not compatible and he desires further counseling, he is advised of actions he may wish to take. The following is an example of such actions:

1. RETAKE THE ASVAB. THE JOBS WERE SELECTED ACCORDING TO JOB APTITUDE REQUIREMENTS AND YOUR ASVAB SCORES. IF YOU FEEL THAT THE ASVAB SCORES ARE NOT A TRUE REFLECTION OF YOUR APTITUDE AREAS, THEN YOU CAN ENTER NEW ASVAB SCORES IN THE COMPUTER SYSTEM AT ANOTHER COUNSELING SESSION. TO RETAKE THE ASVAB, CONTACT A NAVY RECRUITER.
2. YOU MAY DESIRE TO CHANGE YOUR EDUCATIONAL LEVEL (QUESTION 1, PAGE 3 OF YOUR BOOKLET). THE JOBS SELECTED AND PRESENTED IN SECTION II OF THIS PRINTOUT WERE BASED, IN PART, UPON THE MINIMUM EDUCATIONAL LEVEL REQUIRED FOR ENTRY INTO THESE JOBS. THEREFORE, THE HIGHER LEVEL OF EDUCATION YOU ANTICIPATE COMPLETING, THE GREATER NUMBER OF OCCUPATIONS THE COMPUTER WILL SELECT FOR YOU. HOWEVER, YOU SHOULD BE REALISTIC. THERE IS NO POINT IN INDICATING THAT YOU PLAN TO COMPLETE 4 YEARS OF COLLEGE AND HAVE THE COMPUTER LIST ALL THE RELATED OCCUPATIONS WHEN, IN FACT, YOU ARE CERTAIN THAT THE HIGHEST LEVEL OF EDUCATION YOU ANTICIPATE COMPLETING IS A TECHNICAL SCHOOL OR APPRENTICESHIP PROGRAM.
3. IN ADDITION TO SELECTING OCCUPATIONS BASED UPON YOUR APTITUDES AND EDUCATIONAL PLANS, THE JOBS PRESENTED IN SECTION II WERE IDENTIFIED ACCORDING TO YOUR OCCUPATIONAL INTERESTS AS SHOWN IN QUESTION 2 ON PAGE 3 OF YOUR WORK BOOKLET. IF YOU ARE NOT REASONABLY CERTAIN OF YOUR SELECTIONS, YOU MAY DESIRE TO TAKE AN INTEREST INVENTORY. MOST INTEREST INVENTORIES WILL TELL YOU HOW HIGH OR LOW YOUR INTERESTS ARE IN RELATION TO PEOPLE WHO ARE WORKING IN VARIOUS OCCUPATIONS. IF YOU DESIRE THIS TYPE OF HELP, SEE YOUR COUNSELOR OR A NAVY RECRUITER.

#### NVIS Functions

In summary, then, the prototype NVIS performs the following functions:

1. Identifies civilian jobs that match the student's aptitudes, occupational interests, and educational plans.
2. Provides a short description for each selected civilian job.
3. Provides a descriptive comparison between the individual's personal traits and those associated with the selected jobs.
4. Identifies inconsistencies among educational plans, occupational interests, aptitudes, stated career choices, and occupational requirements.
5. Identifies Navy occupations related to each of the selected civilian jobs.
6. Provides Navy percentile scores for each aptitude subtest, and a summary of the questionnaire responses.
7. Identifies Navy occupations for which the individual is qualified for entry on the basis of ASVAB scores.

8. Identifies DOT worker trait groups that correspond to the individual's school subject interests, aptitudes (as measured by the ASVAB), interest factors (type of work activities), and temperament (ability to adjust to or cope with various work situations).

9. Describes the work performed for each worker trait group and explains the training and methods of entry into the field.

10. Provides examples of civilian jobs contained in each worker trait group and identifies related Navy occupations.

11. Identifies sources of additional occupational information.



## DISCUSSION AND CONCLUSIONS

The Navy Vocational Information System (NVIS) was designed to provide both civilian and Navy career information to upper-division high school students. Although the majority of students using the system probably will be interested only in the civilian job information, they will see, perhaps for the first time, the relationship between civilian and Navy occupations and be made aware of those training programs in which they are qualified to enter.

Although the high school students who participated in the preliminary demonstration of NVIS experienced no difficulty in operating the equipment or in responding to instructions, subsequent trial demonstrations, as well as an evaluative paradigm, are needed to assess the system's utility in an operational environment. Such demonstrations, which are scheduled in FY 78, will use a configuration similar to that used in the preliminary demonstration; that is, a van, remote computer, and interconnecting telephone lines. However, for use in future trials, engineering specifications are being developed for a van-mounted computer configuration, which would allow the system to be moved from one site to another with a minimum of disruption.

At the heart of NVIS is the system/student real-time interactive dialogue, in which the student interacts with the system through a cathode ray tube and a keyboard. To extend the usefulness of this feature, a subsequent dialogue is being developed that is intended solely for interacting with individuals who are seriously considering enlisting in the Navy. This dialogue will deal specifically with alternative Navy careers, addressing such questions as choice of duty assignments, "A" School opportunities, school seat availability, and trade-offs between ratings in terms of period of enlistment and schooling opportunities. The ultimate purpose of such computerized dialogues is to provide the applicant with personalized, complete, uniform, and unbiased information concerning Navy ratings and various alternatives. Such dialogues are not intended to replace the counseling role of recruiters or classifiers; rather, they are meant to supplement their efforts. A wide range of occupational information from numerous sources and continually updated text file information should characterize the counseling system. The payoff, of course, is that the computer can match an applicant's skills with a much wider range of job opportunities than is normally possible.

Implementation of NVIS will provide standardized occupational information to the recruit applicant, thus minimizing or at least limiting the introduction of information bias by recruits. The applicant will thus benefit from complete information and impartial guidance in selecting a job or training school, and the recruiter or classifier will be free of the need for broad and current knowledge of Navy occupations and training.

## RECOMMENDATIONS

1. Eighty percent of the high school students in the demonstration who were eligible to take the Armed Services Vocational Aptitude Battery (ASVAB) took advantage of the Navy Vocational Information System (NVIS), which indicates that a much larger percentage of the high population would take advantage of ASVAB if it were offered in conjunction with NVIS. This hypothesis should be investigated through controlled operational tests designed to measure the impact of NVIS on increasing participation in the ASVAB testing program.
2. Subsequent trials should be held to determine if a recruiter's productivity is enhanced due to the increasing number of recruits he is able to communicate with via the computerized dialogue. These trials should specify experimental and control groups, along with other design conditions.
3. Because of the importance of NVIS user response and acceptance, future field trials should focus upon utilization of the Career Education Summary by the potential Navy recruit, his parents, and the counseling community. Also, user comments should be solicited and, where appropriate, incorporated in system refinements.
4. Plans should be made to conduct NVIS cost/benefit analyses and to provide needed management decision documentation. The need for such analyses and documentation will become more critical when engineering specifications for the van-mounted minicomputer are refined and finalized. At that time, questions will arise relating to cost per accession using NVIS, the procurement of additional vans and their geographical placement, and operational responsibility and maintenance.
5. Additional research is required to establish the relationship between ASVAB and similar civilian-oriented placement instruments such as the General Aptitude Test Battery and the Differential Aptitude Test Battery. This would include psychometric research to more precisely equate ASVAB scores with scores of more widely used civilian equivalents and to determine the relationship between ASVAB scores and performance in civilian occupations as well as successful completion of occupational training programs.



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